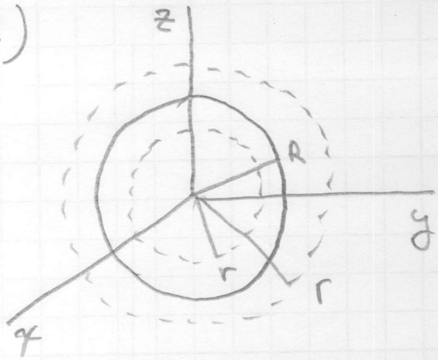
2-12)



for $r > R$, you get the same result as 2-11.

$$\vec{E}_{out} = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}\hat{r}$$ same as 2.8

for $r < R$

$$\nabla \cdot \vec{E}_{in} = \frac{\rho}{\varepsilon_0}$$

$$\int_V \nabla \cdot \vec{E}_{in}\, d\tau = \int_V \frac{\rho}{\varepsilon_0}\, d\tau$$

$$\oint_S \vec{E}_{in} \cdot d\vec{A} = \frac{\rho}{\varepsilon_0}\int_V d\tau$$

$$\cancel{4}\pi \cancel{r^2} E_{in} = \frac{\rho}{\varepsilon_0}\frac{\cancel{4}}{3}\pi r^{\cancel{3}\,1}$$

$$E_{in} = \frac{\rho r}{3\varepsilon_0}$$

$$\therefore \quad \vec{E}_{in} = \frac{\rho r}{3\varepsilon_0}\hat{r}$$ same as 2.8